

**S.T. Semester –III**

**Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education (CBCGS- HME 2020) Syllabus under Autonomy Scheme**

B.TECH. Internet of Things (IOT)					S.T. SEM : III				
Course Name: Applied Mathematics-III					Course Code: BSC-IOT301				
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)				
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation				
Hours Per Week					Theory (100)		Practical/Oral (25)	Term Work (25)	Total
Theory	Tutorial	Practical	Contact Hours	Credits	IA	ESE	PR/O	TW	125
3	1	-	4	4	40	60	-	25	
<b>IA: In Semester Assessment - Paper Duration – 1.5 Hours</b> <b>ESE: Semester End Examination- Paper Duration - 3 Hours</b> <b>The weightage of marks for continuous evaluation of Term work: Formative (40%), Timely completion of tutorial (40%) and Attendance (20%)</b>									
<b>Prerequisite: Mathematics I, Mathematics II</b>									

**Course Objective:**

To familiarize the prospective engineers with techniques in Transform Calculus and linear algebra (Vector Spaces). It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

**Course Outcomes:**

Students will be able to -

Sr.No.	Course Outcomes	Cognitive levels as per bloom's Taxonomy
1	Able to apply the Laplace Transform and its properties to evaluate the integrals.	L1,L2,L3
2	Able to apply the integral transform calculus to solve the ODEs and PDEs by Laplace Transform method & Inverse Laplace Transform.	L1,L2,L3
3	Able to compute the Fourier Series, its complex form.	L1,L2,L3
4	Able to apply the concept of Fourier Transform and Inverse Fourier transform for learning advanced Engineering Mathematics	L1,L2,L3
5	Able to apply the concept of Z Transform and Wavelet Transform.	L1,L2,L3
6	Able to use the Linear Algebra Vector Spaces that is fundamental to application of analysis to Engineering problems.	L1,L2,L3

**Detailed Syllabus:**

Module No.	Topics	Hrs.	Cognitive levels as per bloom's Taxonomy
1	<b>Laplace Transform -I</b> Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions, Evaluation of integrals by Laplace transform	6	L1,L2,L3
2	<b>Laplace Transform -II</b>		L1,L2,L3

	Finding inverse Laplace transform by different methods, convolution theorem, solving ODEs and PDEs by Laplace Transform method.	7	
3	<b>Fourier Series</b>	7	L1,L2,L3
	Introduction: Orthogonal and Orthonormal set of functions, Introduction of Dirchlet's conditions, Euler's formulae. Fourier Series of Functions: Exponential, trigonometric functions of any period =2L, even and odd functions, half range sine and cosine series		
4	<b>Fourier Transform</b>	8	L1,L2,L3
	Fourier Integral representation Fourier Transform, and Inverse Fourier transform of constant and exponential function. Properties and its application		
5	<b>Z Transform and Wavelet Transform</b>	8	L1,L2,L3
	Z-transform: properties, methods, inverses, and their applications, Wavelet transform: properties, methods, inverses, and their applications		
6	<b>Linear Algebra: Vector Spaces</b>	9	L1,L2,L3
	Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, Inverse of a linear transformation, composition of linear maps, Matrix associated with a linear map.		

### Books and References:

Sr No.	Title	Authors	Publisher	Edition	Year
1	Advanced Engineering Mathematics	Erwin kreyszig	John Wiley & Sons	9th Edition	2006
2	A text book of Engineering Mathematics	N.P. Bali and Manish Goyal	Laxmi Publications	9th Edition	2008
3	Higher Engineering Mathematics	B.S. Grewal	Khanna Publishers	36th Edition	2010
4	Engineering Mathematics	Veerarajan T	Tata McGraw-Hill, New Delhi.	3rd Edition	2008
5	Higher Engineering Mathematics	Ramana B.V	Tata McGraw Hill, New Delhi	11th Edition	2010
6	Linear Algebra: A Modern Introduction	D. Poole	Brooks/Cole	2nd Edition	2005
7	An introduction to Linear Algebra	V. Krishnamurthy, V.P. Mainra and J.L. Arora	Affiliated East-West press	-	2005

### Online References:

Sr. No.	Website Name	URL	Modules covered
1	<a href="http://nptel.ac.in">http://nptel.ac.in</a>	<a href="https://nptel.ac.in/courses/111/106/111106051/">https://nptel.ac.in/courses/111/106/111106051/</a> <a href="https://nptel.ac.in/courses/111/101/111101115/">https://nptel.ac.in/courses/111/101/111101115/</a>	M5 M6
2	<a href="http://www.swayam.gov.in">www.swayam.gov.in</a>	<a href="https://swayam.gov.in/nd1_noc19_ma20/preview">https://swayam.gov.in/nd1_noc19_ma20/preview</a> <a href="https://nptel.ac.in/courses/111/106/111106046/">https://nptel.ac.in/courses/111/106/111106046/</a>	M1, M2 M4
3	<a href="http://www.edx.org">www.edx.org</a> <a href="http://nptel.ac.in">http://nptel.ac.in</a>	<a href="https://www.edx.org/course/differential-equations-fourier-series-and-partial-differential-equations">https://www.edx.org/course/differential-equations-fourier-series-and-partial-differential-equations</a> <a href="https://nptel.ac.in/courses/111/106/111106046/">https://nptel.ac.in/courses/111/106/111106046/</a>	M3

**S.T. Semester –III**

**Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education (CBCGS- HME 2020) Syllabus under Autonomy Scheme**

<b>B.TECH. Internet of Things (IOT)</b>					<b>S.T. SEM : III</b>					
<b>Course Name : Analog and Digital Circuits</b>					<b>Course Code :PCC- IOT301</b>					
<b>Teaching Scheme (Program Specific)</b>					<b>Examination Scheme (Formative/ Summative)</b>					
<b>Modes of Teaching / Learning / Weightage</b>					<b>Modes of Continuous Assessment / Evaluation</b>					
<b>Hours Per Week</b>					<b>Theory (100)</b>		<b>Practical/Oral (25)</b>	<b>Term Work (25)</b>	<b>Total</b>	
<b>Theor y</b>	<b>Tutoria l</b>	<b>Practica l</b>	<b>Contact Hours</b>	<b>Credit s</b>	<b>IA</b>	<b>ESE</b>	<b>PR</b>	<b>TW</b>	<b>150</b>	
3	-	2	5	4	40	60	25	25		
<b>IA: In-Semester Examination- Paper Duration – 1.5 Hour</b> <b>ESE : Semester End Examination- Paper Duration - 3 Hours</b> <b>The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of practical (40%) and Attendance (20%)</b>										
<b>Prerequisite: Basic Electrical Engineering (BEE), Physics</b>										

**Course Objective:**

To acquire the basic knowledge of analog and digital circuits so that students will be able to analyze and design various analog and digital electronic circuits.

**Course Outcomes:**

Students will be able to -

SN	Course Outcomes	Cognitive Levels as per Bloom's Taxonomy
1	To analyze characteristics and explain working of different analog devices.	L1,L2,L3
2	To design amplifiers for the given specifications.	L1,L2,L3, L4
3	Design of different circuits using op-amp.	L1,L2,L3,L4
4	Perform various logical and arithmetic operations on binary number systems and apply Boolean algebra	L1,L2,L3
5	Design and implement combinational logic circuits	L1,L2,L3,L4
6	Design and implement sequential logic circuits	L1,L2,L3,L4

**Detailed Syllabus:**

Module No.	Topics	Hrs.	Cognitive Levels as per Bloom's Taxonomy
01	<b>Analog Devices</b>	07	L1,L2,L3
	1.1 PN Junction Diode: Basic Structure, Principle of Operation, V-I characteristics, other diodes: Photo Diode, LED, Solar Cell		
	1.2 Bipolar Transistor: BJT operations, voltages, and currents, BJT characteristics (CE, CB configurations), BJT as an amplifier 1.3 MOSFETs: Basic Structure, Various configurations, and Characteristics (CS & CG)		
02	<b>Amplifier Design</b>	10	L1,L2,L3,L4
	2.1 CE and CB amplifier, Biasing, DC analysis		
	2.2 CS and CG amplifiers using FET and MOSFET, Biasing & DC & AC analysis		
	2.3 Frequency response of Amplifiers 2.4 Design of low power amplifier, LDO, DC-DC converters, low power software		
03	<b>Operational Amplifiers</b>	06	L1,L2,L3,L4
	3.1 Ideal OPAMP behavior, common OPAMP ICs		
	3.2 Basic OPAMP circuits- Inverting amplifier, Non-inverting amplifier, Summing Amplifiers, Differentiators, Integrators, Voltage follower (Buffer), Schmitt Trigger 3.3 Active first order filter : Low pass and high pass		
04	<b>Number System</b>	06	L1,L2,L3
	Review of Number System – Decimal, Binary, Octal, Hexadecimal and number system conversion Review of Codes: Excess-3 Code, Gray Code, Weighted code, BCD, Parity Code One's and two's complements		
05	<b>Combinational Circuit Design</b>	08	L1,L2,L3,L4
	Introduction to combinational circuits, Digital logic gates, Realization using NAND, NOR gates, Boolean Algebra, De Morgan's Theorem		
	SOP and POS representation, K Map up to four variables and Quine-McClusky method up to four variables Half adder, Full adder, Half Subtractor, Full Subtractor, BCD adder, Magnitude Comparator, Multiplexer, Demultiplexers		
06	<b>Sequential Circuit Design</b>	08	L1,L2,L3,L4
	Introduction to sequential circuits, Concept of latches and flip flops, different flip flops, Conversion of flip flops, concept of Asynchronous and synchronous counters, concept of shift registers, Design of Counters		

### Books and References:

SN	Title	Authors	Publisher	Edition	Year
1	Integrated Electronics	Millman and Halkies	TATA McGraw Hill.	2 <sup>nd</sup> Edition.	2002
2	Electronic Circuit Analysis and Design	Donald A. Neamen	TATA McGraw Hill,	4 <sup>th</sup> Edition.	2009
3	Electronic Devices and Circuit Theory	Robert Boylestad	Pearson Education	4 <sup>th</sup> Edition	2004(reprint)
4	Modern Digital Electronics	R. P. Jain	Tata McGraw Hill Education	3 <sup>th</sup> Edition	2003
5	Digital Design Principles and Practices	John F. Warkerly	Pearson Education	4 <sup>th</sup> Edition	2008
6	Fundamentals of Digital Circuits	A. Anand Kumar	PHI	4 <sup>th</sup> Edition	2016
7	Digital Design	Morris Mano / Michael D. Ciletti	Pearson Education	Fourth Edition	2008
8	Digital Principles and Applications	Donald P. Leach / Albert Paul Malvino / Gautam Saha	McGraw Hill	Seventh Edition	2011
9	Digital Fundamentals	Thomas L. Floyd	Pearson Prentice Hall	Eleventh Global Edition	2015
10	Linear Integrated Circuits	D.Roy Choudhury, Shail B. Jain	New Age International Publications	Fourth Edition	2018

### Online References:

S. No.	Website Name	URL	Modules Covered
1	www.crectirupati.com	<a href="http://www.crectirupati.com/sites/default/files/lecture_notes/DLD%20lecture%20notes.pdf">http://www.crectirupati.com/sites/default/files/lecture_notes/DLD%20lecture%20notes.pdf</a>	M1-M6
2	www.engrcs.com	<a href="https://www.engrcs.com/courses/engr250/engr250lecture.pdf">https://www.engrcs.com/courses/engr250/engr250lecture.pdf</a>	M1-M6
3	www.uptusuccess.com	<a href="https://uptusuccess.com/digital-logic-design-rec301/">https://uptusuccess.com/digital-logic-design-rec301/</a>	M1-M3
4	Tutorial points (Gate lectures)	<a href="https://www.youtuB.TECH..com/watch?v=vsoYIH1_hbc&amp;list=PLWPirh4EWFpHk70zwYoHu87uVsCC8E2S-">https://www.youtuB.TECH..com/watch?v=vsoYIH1_hbc&amp;list=PLWPirh4EWFpHk70zwYoHu87uVsCC8E2S-</a>	M1-M6

**Suggested List of Practical/ Experiments:**

Practical Number	Type of Experiment	Practical/ Experiment Topic	Hrs.	Cognitive Levels as per Bloom's Taxonomy
1	<b>Basic Experiments</b>	To implement CE configuration of BJT and plot the input output characteristics and study the frequency response	2	L3, L4
2		To implement Summing amplifier using OP-AMP	2	L3, L4
3		Implement all the gates using Universal gates. (NAND/NOR - IC 7400/7402)	2	L3
4		Implement half and full adders using combinational circuits	2	L3
5		Simulate and compare NMOS, PMOS Inverter	2	L3, L4, L5
6		Design of Low power amplifier	2	L3, L4, L5
7	<b>Design Experiments</b>	To design CS amplifier and verify design specifications	2	L3, L4, L5
8		Design code converter circuits using gates. (IC - 7408,7432,7404,7486)	2	L3, L4, L5
9		Implement logic equations using Multiplexer or demultiplexer	2	L3, L4
10	<b>Advanced Experiments</b>	Design of asynchronous / Synchronous / sequence generator using flip flops	2	L3, L4, L5
11 - 15	<b>Mini/Minor Projects/ Seminar/ Case Studies</b>	Some suggestions are- (not limited to these only) 1. Two-digit counter using seven segment display 2. Implement luggage security system 3. RFID based Attendance System 4. Computer Simulation Code for the Quine-McCluskey Minimization Method 4. Fire alarm circuit 5. Automatic water level indicator 6. Auto cut off circuit	10	L3, L4, L5

**S.T. Semester –III**

**Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education  
 (CBCGS- HME 2020) Syllabus under Autonomy Scheme**

B.TECH. Internet of Things (IOT)							S.T. SEM : III		
Course Name : Introduction to IoT and Sensor technology							Course Code : PCC- IOT302		
Teaching Scheme (Program Specific)					Examination scheme				
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation				
Hours Per Week- Theory (100)							Practical/Oral (25)	Term Work (25)	Total
Theory	Tutorial	Practical	Contact Hours	Credits	IA	ESE	OR	TW	150
3	-	2	5	4	40	60	25	25	
<b>IA : In Semester Examination - Paper Duration – 1 Hours</b> <b>ESE : End Semester Examination - Paper Duration - 3 Hours</b> <b>The weightage of marks for continuous evaluation of Term work/Report:</b> Formative (40%), Timely completion of practical (40%) and Attendance (20%)									
<b>Prerequisite:</b> Basic Electrical Engineering (BEE), Physics, Digital Circuit Design, Analog Electronics									

**Course Objective:**

To impart the knowledge of design features, data handling, data communication, data networking and design issues of IoT.

**Course Outcomes:**

Students will be able to:

SN	Course Outcomes	Cognitive Levels as per Blooms Taxonomy
1	Identify and describe the need and evolution of Internet of Things	L1, L2,L3
2	Describe working principle of ADCs and DACs	L1,L2,L3
3	Describe working principle IOT sensors and actuators	L1,L2,L3
4	Explain working principle of on-board peripherals	L1,L2,L3
5	Describe the specifications of IOT components from data sheet	L1,L2,L3
6	Explain various IoT related used cases and applications	L1,L2,L3

**Detailed Syllabus:**

Module No.	Topics	Hrs	Cognitive Levels as per Blooms Taxonomy
1	<b>Basics of IoT</b>	3	L1,L2,L3
	Definition of “Internet of Things”, Technological trends which have led to IoT, impact of IoT on society, History of IOT, How IOT works, IOT Applications, Characteristics of IoT, Challenges of IoT, Advantages of IoT, Disadvantages IOT, evolution of IOT		
2	<b>ADCs and DACs</b>	8	L1,L2,L3
	DAC principle, weighted register DAC, R-2R ladder DAC, performance characteristics of DAC, ADC principle, flash ADC, successive approximation ADC, counter type ADC, dual slope ADC, performance characteristics of ADC,actuators.		

4	<b>On board peripherals</b>		
	Disk controllers, Integrated graphic controller, integrated sound card, fast ethernet network controller, USB 2.0, IRDA controller, temperature, PS/2 port, VGA port, DVI port, HDMI port, Ethernet port, audio card, voltage and fan speedcontroller to monitor health of computer components, Multiplexers, Power devices, Displays and glue logic for I/Os, Data sheet reading of on-boardperipherals	9	L1,L2,L3
5	<b>Arduino board</b>		
	Introduction to Arduino board, interfacing sensors and actuators to Arduino board.	8	L1,L2,L3
6	<b>IOT use cases and applications</b>		
	Smart homes, wearables, smart city, smart grid, industrial internet, connected cars, connected health, smart retail, smart supply chain, smart farming	9	L1,L2,L3

### Books and References:

S. No.	Title	Authors	Publisher	Edition	Year
1	Internet of Things: A Hands-on Approach	ArshdeepBahga and Vijay Madiseti	Universities Press	2 <sup>nd</sup> Edition	-
2	Internet of Things: Architecture and Design Principles	Rajkamal	McGraw Hill Education	1st edition	-
3	IoT Fundamentals Networking Technologies, Protocols and Use Cases for Internet of Things	David Hanes , Gonzalo salgueiro	Cisco Press	Kindle Edition	2017
4	Designing the Internet of Things	Adrian McEwen, Hakim Cassimally	Paperback	1st edition	-
5	Analytics for the Internet of Things(IoT)	Andrew Minteer	Kindle Edition	1st edition	-

### Online References:

S. No.	Website Name	URL	Modules Covered
1	<a href="http://www.nptel.ac.in">www.nptel.ac.in</a>	<a href="https://youtu.be/WUYAjxnwjU4?list=PLaxu2gn-9WXMf_In5pMvxjf043jzof4-i&amp;t=13">https://youtu.be/WUYAjxnwjU4?list=PLaxu2gn-9WXMf_In5pMvxjf043jzof4-i&amp;t=13</a>	M1,M2,M3
2	<a href="http://www.iitk.ac.in">www.iitk.ac.in</a>	<a href="https://youtu.be/p7kYStiASLo?list=PLbRMhDVUMngdcLdH4-YF1uJI4IuhcDZPR&amp;t=7">https://youtu.be/p7kYStiASLo?list=PLbRMhDVUMngdcLdH4-YF1uJI4IuhcDZPR&amp;t=7</a>	M4, M5, M6
3	<a href="http://www.nptel.ac.in">www.nptel.ac.in</a>	<a href="https://nptel.ac.in/courses/108108098/">https://nptel.ac.in/courses/108108098/</a>	M1 to M6
4	<a href="http://www.edureka.com">www.edureka.com</a>	<a href="https://youtu.be/LlhmzVL5bm8?list=PL9ooVrP1hQOGccfBbP5tJWZ1hv5sIUWJI&amp;t=120">https://youtu.be/LlhmzVL5bm8?list=PL9ooVrP1hQOGccfBbP5tJWZ1hv5sIUWJI&amp;t=120</a>	M1,M2,M3,M4

**Suggested list of Practical/ Experiments: (not limited to these only)**

Practical Number	Type of Experiment	Practical/ Experiment Topic	Hrs.	Cognitive Levels as per Blooms Taxonomy
1	<b>Basic Experiments</b>	Build, test, and troubleshoot an ADC circuit using Spice	2	L1,L2,L3
2		Build, test, and troubleshoot an DAC circuit using Spice	2	L1,L2,L3
3		Verifying sensors parameters	2	L1,L2,L3
4		Verifying actuators parameters	2	L1,L2,L3
5		Study of Arduino Board	2	L1,L2,L3
6		Compare different Arduino boards	2	L1,L2,L3
7		To identify the peripherals of a computer, assemble and disassemble the system.	2	L1,L2,L3
8	<b>Design Experiments</b>	Interface sensors to Arduino board	2	L1,L2,L3
9		Interface Actuators to Arduino board	2	L1,L2,L3
10	<b>Advanced Experiments</b>	Control the relay output in accordance with the sensor data	2	L1,L2,L3
11-13	<b>Mini/Minor Projects/ Seminar/ Case Studies</b>	Group Wise Mini/Minor Projects/ Seminar/ Case Studies	6	L1,L2,L3
14-15	<b>Group Presentation / Case studies</b>	Group Wise Group Presentation / Case studies	4	L1,L2,L3

**S.T. Semester –III**

**Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education (CBCGS- HME 2020) Syllabus under Autonomy Scheme**

<b>B.TECH. Internet of Things (IOT)</b>							<b>S.T. SEM : III</b>		
Course Name :Data Structure							Course Code :PCC-IOT303		
Teaching Scheme (Program Specific)					Examination scheme				
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation				
Hours Per Week- Theory (100)							Practical/ Oral (25)	Term Work (25)	Total
Theor y	Tutoria l	Practica l	Contac t Hours	Credits	IA	ESE	OR	TW	150
3	-	2	5	4	20	20	60	25	
<b>IA:In Semester Examination - Paper Duration – 1.5 Hours</b> <b>ESE : End Semester Examination - Paper Duration - 3 Hours</b>									
<b>The weightage of marks for continuous evaluation of Term work/Report:</b> Formative (40%), Timely completion of practical (40%) and Attendance (20%)									
<b>Prerequisite:</b> Computer Basics, Procedural Programming Languages									

**Course Objective:** The course intends to deliver the fundamentals of data structures by providing a platform to learn, compare and apply them in real world scenario.

**Course Outcomes:**

Upon completion of the course students will be able to:

SN	Course Outcomes	Cognitive Levels as per Blooms Taxonomy
1	Compare linear and non-linear data structures.	L1, L2
2	Apply operations like insertion, deletion, searching and traversing on stack and queue data structures.	L1, L2, L3
3	Apply operations like insertion, deletion, searching and traversing on linked list data structures.	L1, L2, L3
4	Apply operations like insertion, deletion, searching and traversing on tree data structures	L1, L2, L3
5	Apply operations like insertion, deletion, searching and traversing on graph data structures	L1, L2, L3
6	Understand and apply various advanced data structures	L1, L2, L3, L4

**Detailed Syllabus:**

Module No.	Topics	Hrs	Cognitive Levels as per Blooms Taxonomy
1	<b>Introduction to Data Structure</b>	4	L1, L2
	Introduction, Types of data Structures, Abstract data type, concrete data structures (array, hash table) associative array, sets, Operations on Data Structures		
2	<b>Linear Data Structure</b>		

	<p><b>Stack:</b> operations on stack, stack implementation using an array, applications of stack.</p> <p><b>Queues:</b> operations on queue, types of queue, queue implementation using an array, application of queue.</p>	8	L1, L2, L3
3	<p><b>Linked List:</b> operations on linked list, Types of linked lists: Single linked list, Double Linked list, Implementation of linked list, stack</p> <p>Implementation using linked list, queue implementation using linked list, Applications of linked list.</p>	8	L1, L2, L3
4	<b>Non-Linear Data Structure</b>	9	L1, L2, L3
	<p><b>Trees:</b> Tree terminologies, Binary tree traversal (in-, pre-, post-order), Binary search tree properties and operations, threaded binary tree, Height</p> <p>balanced binary tree-AVL (insertion, deletion example only), B tree, B+ Tree</p>		
5	<p><b>Graphs:</b> Graph terminologies, Graph representation in memory, Graph traversing techniques: Breadth First Search, Depth First Search,</p> <p>Applications of graph</p>	7	L1, L2, L3
6	<b>Advanced Data Structure</b>	9	L1, L2, L3, L4
	<p>Hashing, Introduction to heap data structure, Binomial Heaps- Binomial trees and binomial heaps, operations on binomial heap, Red-Black Trees: properties and operations of red-black trees, Analysis of all above operations.</p>		
<b>Total Hours</b>		45	

### Books and References:

S. No.	Title	Authors	Publisher	Edition	Year
1	Data Structures using C	Reema Thareja	Oxford	2 <sup>nd</sup> Edition	2014
2	Data Structures: A Pseudocode Approach with C	Richard F. Gilberg & Behrouz A., Forouzan	CENGAGE Learning	2 <sup>nd</sup> Edition	2011
3	Data Structures Using C	Aaron M Tenenbaum, Yedidyah Langsam, Moshe J Augenstein	Pearson	2 <sup>nd</sup> Edition	2006
4	Data Structures with C	Seymore Lipschutz	Tata McGraw-Hill	India Special Edition	2011

**Online References:**

S. No.	Website Name	URL	Modules Covered
1	www.geeksforgeeks.org	<a href="https://www.geeksforgeeks.org/stack-data-structure/">https://www.geeksforgeeks.org/stack-data-structure/</a>	M1-M6
2	www.studytonight.com	<a href="https://www.studytonight.com/data-structures/introduction-to-data-structures">https://www.studytonight.com/data-structures/introduction-to-data-structures</a>	M1-M3, M6
3	www.w3schools.in	<a href="https://www.w3schools.in/category/data-structures-tutorial/">https://www.w3schools.in/category/data-structures-tutorial/</a>	M1-M4, M6

**Suggested list of Practical/ Experiments:**

Practical Number	Type of Experiment	Practical/ Experiment Topic	Hrs.	Cognitive Levels as per Blooms Taxonomy
1	<b>Basic Experiments</b>	Build a Program for stack using an array (Menu driven program)	2	L1, L2, L3
2		Build a Program for Queue using an array. (Menu driven program)	2	L1, L2, L3
3	<b>Design Experiments</b>	Develop a code for circular queue. (Menu driven)	2	L1, L2, L3
4		Develop a code for Single Linked List. (Menu driven program)	2	L1, L2, L3
5		Develop a code for Binary Search Tree (Menu driven program)	2	L1, L2, L3
6		Develop a code for BFS/DFS. (Menu driven program)	2	L1, L2, L3
7		Develop a code for Hashing technique with collision resolution.	2	L1, L2, L3
8		Develop a code for Binomial heap	2	L1, L2, L3
9	<b>Case Study</b>	AI, Big Data and Education, Data Science in Education	4	L1, L2, L3
10	<b>Mini/Minor Projects/ Seminar/ Case Studies</b>	<b>Mini Project:</b> <ol style="list-style-type: none"> <li>Maze generator</li> <li>Movie recommendation system</li> <li>Calendar Application</li> <li>Train Reservation System</li> <li>Digital Voltmeter</li> </ol>	8	L1, L2, L3, L4
<b>Total Hours</b>			30	

**S.T. Semester –III**

**Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education (CBCGS- HME 2020) Syllabus under Autonomy Scheme**

<b>B.TECH. Internet of Things (IOT)</b>							<b>S.T. SEM : III</b>		
<b>Course Name : Operating System</b>							<b>Course Code : ESC-IOT301</b>		
<b>Teaching Scheme (Program Specific)</b>					<b>Examination scheme</b>				
<b>Modes of Teaching / Learning / Weightage</b>					<b>Modes of Continuous Assessment / Evaluation</b>				
<b>Hours Per Week- Theory (100)</b>							<b>Practical/Oral (25)</b>	<b>Term Work (25)</b>	<b>Total</b>
<b>Theor y</b>	<b>Tutoria l</b>	<b>Practica l</b>	<b>Contac t Hours</b>	<b>Credits</b>	<b>IA</b>	<b>ES E</b>	<b>OR</b>	<b>TW</b>	<b>150</b>
3	-	2	5	4	40	60	25	25	
<b>IA:In Semester Examination - Paper Duration – 1.5 Hours</b> <b>ESE : End Semester Examination - Paper Duration - 3 Hours</b> <b>The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of practical (40%) and Attendance (20%)</b>									
<b>Prerequisite: Computer Organization and Architecture, Fundamentals of Data Structures</b>									

**Course Objective:**

The course intends to deliver the fundamental knowledge of Operating system and apply this knowledge for implementing and analyzing Process, Memory, I/O disk and File management techniques.

**Course Outcomes:**

Students will be able to:

SN	Course Objectives	Cognitive Levels as per Bloom's Taxonomy
1	Understand the role of operating system in a computer	L1, L2
2	Make use of various Scheduling algorithms.	L1, L2, L3
3	Apply the principles of concurrency.	L1, L2, L3
4	Examine deadlock, prevention and avoidance algorithms	L1, L2, L3
5	Compare and contrast various memory management schemes	L1, L2
6	Develop a prototype file systems.	L1, L2, L3

**Detailed Syllabus:**

Module No.	Topics	Hrs.	Cognitive Levels as per Bloom's Taxonomy
1	<b>Overview of Operating System</b>	4	L1, L2
	Operating System Objectives and Functions, The Evolution of Operating Systems, Operating System Structures, System Calls, Developments Leading to Modern Operating Systems, Virtual Machines		
2	<b>Process Management</b>	4	L1, L2, L3
	Processes and Threads:Process: Concept of a Process, Process States, Process Description, Operations on Processes, Execution of the Operating System; Threads: Processes and Threads, Concept of Multithreading, Types of Threads, Thread programming Using Pthreads; Scheduling: CPU Scheduling, Thread Scheduling.		

3	<b>Concurrency Control and Deadlock Handling</b>	10	L1, L2, L3
	Concurrency Control: Principles of Concurrency, Requirements for Mutual Exclusion, Mutual Exclusion: Hardware Support, Operating System Support (Semaphores and Mutex), Programming Language Support (Monitors), Classical synchronization problems: Readers/Writers Problem, Producer and Consumer problem, Interposes communication. Deadlock: Principles of Deadlock, Deadlock Modeling, Strategies to deal with deadlock: The Ostrich Algorithm, Deadlock Prevention, Deadlock Avoidance, Deadlock detection and recovery, An Integrated Deadlock Strategy, Example: Dining Philosophers Problem.		
4	<b>Memory Management</b>	10	L1, L2, L3
	Memory Management: Memory Management Requirements, Memory Partitioning: Fixed Partitioning, Dynamic Partitioning, Buddy System, Relocation, Paging, Segmentation. Virtual Memory: What is Virtual Memory, Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory.		
5	<b>Input / Output And File Management</b>	10	L1, L2
	I/O Management and Disk Scheduling: I/O Devices, Organization of the I/O Function, Operating System Design Issues, I/O Buffering, Disk Scheduling(FIFO, SSTF, SCAN, C-SCAN, LOOK, C-LOOK), Disk Cache. File Management: Overview, File Organization and Access, File Directories, File Sharing, Record Blocking, Secondary Storage Management.		
6	<b>Case Study: LINUX Operating System</b>	7	L1, L2,L3
	Overview of Linux, Architecture, Process management, Memory Management, I/O Management, BASH Shell scripting: Basic shell commands, shell as a scripting language.		

### Books and References:

S. No.	Title	Authors	Publisher	Edition	Year
1	Operating System: Internals and Design Principles	William Stallings	Prentice Hall	8th Edition	2018
2	Operating System Concepts	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne	Wiley	9th Edition	2009
3	Modern Operating System	Andrew S. Tanenbaum& Herbert Bos	Pearson education	4th Edition	2015

### Online References:

S. No.	Website Name	URL	Modules Covered
1	www.tutorialspoint.com	<a href="https://www.tutorialspoint.com/computer_fundamentals/computer_operating_system">https://www.tutorialspoint.com/computer_fundamentals/computer_operating_system</a>	M1,M2,M3,M4,M5, M6
2	www.geeksforgeeks.org	<a href="https://www.geeksforgeeks.org/operating-systems-need-and-functions/">https://www.geeksforgeeks.org/operating-systems-need-and-functions/</a>	M1,M2,M3,M4,M5, M6
3	nptel.ac.in	<a href="https://nptel.ac.in/courses/106106144/2">https://nptel.ac.in/courses/106106144/2</a>	M1,M2,M3,M4,M5, M6

### Suggested list of Practical/ Experiments:

Practical Number	Type of Experiment	Practical/ Experiment Topic	Hrs.	Cognitive Level s as per Blooms Taxonomy
1	<b>Basic Experiments</b>	Explore LINUX Commands (Basic and Advanced)	2	L1,L2,L3
2		Write a program to implement any two CPU scheduling algorithms like FCFS, SJF, Round Robin etc.	2	L1, L2, L3
3	<b>Design Experiments</b>	Write a program to implement Dining Philosopher Problem.	2	L1, L2, L3
4		Write a program to implement Banker's algorithm.	2	L1, L2, L3
5		Build a program to implement FIFO and LRU page replacement policies.	2	L1, L2, L3
6		Build a program to implement SRTF and Priority page replacement policies.	2	L1, L2, L3
7	<b>Advanced Experiments</b>	Develop a program to implement dynamic partitioning placement algorithms i.e. Best Fit, First-Fit, Worst-Fit etc.	4	L1, L2, L3
8		Build a program to implement FCFS and SSTF disk scheduling algorithm	4	L1, L2, L3
9-11	<b>Case Studies</b>	1. Windows Operating System. 2. LINUX Operating System. 3. Multiprocessor Scheduling and Linux Scheduling.	4	L1, L2, L3
12-15	<b>Mini Project</b>	1. Develop a Client-Server application (use the concepts of inter-process communication, multithreading, synchronization and so). 2. Build a file system. 3. Write a shell interpreter for LINUX. 4. Build an online compiler (with interface for inserting the code to be compiled).	6	L1, L2, L3



**TCET**

**DEPARTMENT OF INTERNET OF THINGS**

Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education [CBCGS-HME 2020]

Under TCET - Autonomy Scheme - 2020

**University of Mumbai**



**S.T. Semester –III**

**Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education (CBCGS- HME 2020) Syllabus under Autonomy Scheme**

<b>B.TECH. Internet of Things (IOT)</b>					<b>S.T. SEM : III</b>					
Course Name :Environmental Studies					Course Code :MC-IOT301					
<b>Teaching Scheme (Program Specific)</b>					<b>Examination Scheme (Formative/ Summative)</b>					
<b>Modes of Teaching / Learning / Weightage</b>					<b>Modes of Continuous Assessment / Evaluation</b>					
<b>Hours Per Week</b>					<b>Theory (100)</b>		<b>Practical/Oral (25)</b>		<b>Term Work (25)</b>	<b>Total</b>
<b>Theory</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Contact Hours</b>	<b>Credits</b>	<b>IA</b>	<b>ESE</b>	<b>PR/OR</b>	<b>TW</b>	<b>25</b>	
1	-	-	1	Non Credit	Passing is mandatory for this course			25		
Term work will be on continues basis										

**Course Objectives:**

To prepare students for careers as leaders in understanding and addressing complex environmental issues from a problem-oriented, interdisciplinary perspective.

**Course Outcomes:**

Students will be able to

<b>Sr. No.</b>	<b>Course Outcomes</b>	<b>Cognitive levels of attainment as per Bloom's Taxonomy</b>
1	Understand effect of population on environment	L1, L2
2	Understand Renewable and Non-renewable resources	L1, L2
3	Understand structure, function and energy flow in ecosystem	L1, L2
4	Understand biodiversity at local, national and global level	L1, L2
5	Apply different methods pollution control methods	L1, L2, L3
6	Understand sustainable social and environmental development	L1, L2

**Detailed Syllabus:**

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	<p><b>The Multidisciplinary nature of environmental studies</b>            Definition, scope and importance. Need for public awareness</p> <p><b>Human population and the environment</b></p> <ul style="list-style-type: none"> <li>● Population growth, variation among nations</li> <li>● Population Explosion- family welfare program</li> <li>● Environment and human health</li> <li>● Women and child welfare</li> <li>● Role of information technology in environment and human health</li> </ul>	2	L1, L2
2	<p><b>Natural resources</b>            Renewable and non-renewable resources</p> <p><b>Natural resources &amp; associated problems:</b></p> <ol style="list-style-type: none"> <li>a. Forest resources:</li> <li>b. Water resources:</li> <li>c. Mineral resources:</li> <li>d. Food resources:</li> <li>e. Energy resources:</li> </ol> <p><b>Role of an individual in conservation of natural resources:</b></p> <ul style="list-style-type: none"> <li>● Equitable use of resources for sustainable lifestyles.</li> </ul>	2	L1, L2, L3
3	<p><b>Ecosystems</b></p> <ul style="list-style-type: none"> <li>● Concepts of an ecosystem.</li> <li>● Introduction, types, characteristic features, structure and function of the following ecosystem:               <ol style="list-style-type: none"> <li>a. Forest ecosystem</li> <li>b. Grassland ecosystem</li> <li>c. Desert ecosystem</li> <li>d. Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)</li> </ol> </li> </ul> <p>Case study on various ecosystems in India.</p>	2	L1, L2, L3
4	<p><b>Biodiversity and its conservation</b></p> <p>Introduction-Definition: genetic species and ecosystem diversity            Bio-geographical classification of India Value of biodiversity:            Consumptive use, productive use, social, ethical, aesthetic and option values, Bio-diversity at global, national, local levels            India as a mega diversity nation            Case study on Bio diversity in India.</p>	3	L1, L2, L3
5	<p><b>Environmental Pollution</b></p> <p>Definition, Causes, effects and control measures of:</p> <ol style="list-style-type: none"> <li>a. Air pollution</li> <li>b. Water pollution</li> <li>c. Soil pollution</li> </ol> <p>Solid waste management: Causes, effect and control measures of urban and industrial wastes            Role of an individual in prevention of pollution            Case study on Pollution            Disaster management: floods, earthquake, cyclone and land slides            Carbon Credits for pollution prevention</p>	3	L1, L2, L3

<b>6</b>	<b>Social issues and environment</b> <ul style="list-style-type: none"> <li>● From unsustainable to sustainable development</li> <li>● Urban problems related to energy</li> <li>● Water conservation, rain water harvesting, watershed management</li> <li>● Environmental ethics: issues and possible solution</li> </ul> <p>Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.</p> <ul style="list-style-type: none"> <li>● Consumerism and waste products</li> <li>● Environment protection act</li> <li>● Public awareness</li> </ul> <p>Case study on Environmental Ethics</p>	<b>3</b>	L1, L2, L3
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### **Books and References:**

Sr. No	Title	Author	Publisher	Edition	Year
1	Text book of environmental studies	ErachBharucha	Universities Press/Orient Blackswan	First	2005
2	Environmental Studies	D L Manjunath	Pearson	First	2006
3	Environmental Studies	Benny Joseph	Tata McGRAW HILL	Second	2009
4	Environmental Studies	JagdishKrishnaswami , R J Ranjit Daniels	Wiley India Private Ltd. New Delhi	First	2009
5	Environmental Studies	AninditaBasak	Pearson	First	2009
6	The Environmental Studies	Deeksha Dave	Cengage learning	Second	2012





### S.T. Semester –III

### Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education (CBCGS-HME-2020) Syllabus under Autonomy Scheme

<b>B.TECH. Internet of Things (IOT)</b>						<b>S.T. SEM :III</b>				
<b>Course Name: Activity Points</b>						<b>Course Code : AP-IOT301</b>				
<b>Teaching Scheme (Program Specific)</b>						<b>Examination scheme</b>				
<b>Modes of Teaching / Learning / Weightage</b>						<b>Modes of Continuous Assessment / Evaluation</b>				
<b>Hours Per Week- Theory (100)</b>						<b>Presentation</b>		<b>Report</b>		<b>Term Work</b>
<b>Theor y</b>	<b>Tutoria l</b>	<b>Practica l</b>	<b>Contact Hours</b>	<b>Credits</b>	<b>IA</b>	<b>ES E</b>	<b>PR &amp;OR</b>		<b>TW</b>	
-	-	-	30	1	-	-	25		25	
<b>AC : Activity</b>										
<b>The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of practical (40%) and Attendance / Learning Attitude (20%)</b>										
<b>Prerequisite: Computer Basics, Procedural Programming Languages</b>										

#### Course Objective:

The course intends to make students learn how to design and program basic java applications. The course intends to develop professional skills necessary for becoming technically skilled personnel.

#### Course Outcomes:

Upon completion of the course students will be able to:

SN	Course Objectives	Cognitive Levels as per Bloom's Taxonomy
1	Understand and apply the concept of class and objects and fundamental Java programming constructs.	L1, L2, L3
2	To apply various String handling and File handling operations along with enhanced looping structures.	L1, L2, L3
3	Analyze and apply the different types of inheritances and interfaces.	L1, L2, L3, L4
4	Understand and compare the various exception handling techniques and exception hierarchy	L1, L2, L3, L4, L5
5	Experiment with notion of multithreading and packages	L1, L2, L3, L4, L5
6	Develop GUI based application	L1, L2, L3, L4, L5, L6

#### Detailed Syllabus:

Module No.	Topics	Key Differentiator	Hrs	Cognitive levels of attainment as per Bloom's Taxonomy
1	<b>Object Oriented Concepts</b>		5	L1, L2, L3
	Basics of object oriented programming , OOP Concepts: Object, Class, Encapsulation, Abstraction, Inheritance, Polymorphism	1. Working on different IDEs (netbeans, eclipse) 2. Setting JAVA Environment 3. Alternatives to new keyword		
	(3 hrs)	(1hrs)		
2	<b>Introduction to Java</b>			

	Basics of Java programming, Data types, Variables, Operators, Looping ,Strings, Arrays in java ,Input / Output in java , objects and classes in java, , Constructor and its types, Visibility modifiers, this reference	<ol style="list-style-type: none"> <li>1. Problem solving using Loops.</li> <li>2. Enhanced For Loop</li> <li>3. String Handling Operations</li> <li>4. Constructor Overloading</li> <li>5. File Handling</li> </ol>	4	L1, L2, L3
	(2 hrs)	(2 hrs)		
3	<b>Inheritance and Polymorphism</b>			
	Inheritance in java, Super and sub class, Polymorphism, Dynamic binding, Abstract class, Interface in java	<ol style="list-style-type: none"> <li>1. Method Overriding</li> <li>2. Method Overloading</li> <li>3. Default and static methods in Interfaces(Java 8)</li> </ol>	6	L1, L2, L3,L4
	(3hrs)	(3 hrs)		
4	<b>Exception Handling</b>			
	Exception and Error, Use of try, catch, throw, throws and finally, Built in Exception, Custom exceptions, Throwable Class	<ol style="list-style-type: none"> <li>1. JVM and Exceptions</li> <li>2. AutoClosable(Java 8)</li> <li>3. Chained Exceptions</li> <li>4. Exception Hierarchy</li> </ol>	5	L1, L2,L3,L4,L5
	(3 hrs)	(2hrs)		
5	<b>Multithreading in java</b>			
	Thread life cycle and methods, Thread class, Runnable interface, Thread synchronization. Package in java	<ol style="list-style-type: none"> <li>1. Concurrency in JAVA</li> <li>2. Atomic Variables</li> <li>3. Alternative to Synchronizatn</li> </ol>	5	L1, L2,L3,L4,L5
	(2 hrs)	(2 hrs)		
6	<b>Event and GUI programming</b>			
	Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, TextFields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing.. Database Connectivity	<ol style="list-style-type: none"> <li>1. GitHub Concepts</li> <li>2. Deploying Applications</li> <li>3. GUI Form validation</li> </ol>	5	L1, L2, L3, L4,L5,L6
	(3 hrs)	(2 hrs)		
	<b>Total Hours</b>		<b>30</b>	

**Books and References:**

SN	Title	Authors	Publisher	Edition	Year
1	Programming with Java(Fifth Edition)	E Balagurusamy	McGraw Hill	Second Edition	2019
2	Java Programming, D. S. Malik	D. S. Malik	Cengage Learning	First Edition	2009
3	Programming in Java	Sachin Malhotra &Saurabh Chaudhary	Oxford University Press	Second edition	2018
4	The Complete Reference, Java 2	Herbert Schild	McGraw Hill.	Fourth Edition	2018
5	Head First Java: A Brain-Friendly Guide	Kathy Sierra and Bert	O'Reilly Media	Second Edition	2005

**Online References:**

S. No.	Website Name	URL	Modules Covered
1	www.javatpoint.com	<a href="https://www.javatpoint.com/java-oops-concepts">https://www.javatpoint.com/java-oops-concepts</a>	M1,M2,M3
2	www.w3schools.com	<a href="https://www.w3schools.com/java/">https://www.w3schools.com/java/</a>	M1-M6
3	www.programiz.com	<a href="https://www.programiz.com/java-programming">https://www.programiz.com/java-programming</a>	M1-M6

**S.T. Semester –III**  
**Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education (CBCGS- HME 2020)**  
**Syllabus under Autonomy Scheme**

<b>B.TECH. Internet of Things (IOT)</b>					<b>S.T. SEM :III</b>		
<b>Course Name: Professional Skills-III (OOPM)</b>					<b>Course Code: HME-IOTPS301</b>		
<b>Teaching Scheme (Holistic and Multidisciplinary Education -HME) Industry Specific/Interdisciplinary</b>					<b>Examination Scheme (Formative/ Summative)</b>		
<b>Modes of Teaching / Learning / Weightage</b>					<b>Modes of Continuous Assessment / Evaluation</b>		
<b>Total Hours</b>					<b>Presentation</b>	<b>Report</b>	<b>Term Work</b>
<b>Theor y</b>	<b>Tutoria l</b>	<b>Practica l</b>	<b>Contac t Hours</b>	<b>Credit s</b>	<b>(AC)</b>	<b>(AC)</b>	<b>75</b>
15	-	30	45	2	50	25	
<b>AC: Activity Evaluation</b>							
<b>The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of practical (40%) and Attendance (20%)</b>							
Course will be conducted in the beginning of the semester during first 03 weeks							
<b>Prerequisite: ESC-103Programming for Problem Solving</b>							

**Course Objective:**

To impart the object-oriented programming concepts using java. To impart programming concept like multithreading, exception handling, packages etc.

**Course Outcomes:**

Students will be able to

SN	Course Outcomes	Cognitive Levels as per Bloom's Taxonomy
1	Apply fundamental programming constructs.	L1, L2
2	Illustrate the concept of packages, classes and objects.	L1, L2, L3, L4
3	Elaborate the concept of strings arrays and vectors.	L1, L2, L3
4	Implement the concept of inheritance and interfaces.	L1, L2, L3
5	Implement the notion of exception handling and multithreading.	L1, L2, L3,L4
6	Develop GUI based application	L1, L2, L3, L4

**Detailed Syllabus:**

Module No.	Topics	Hrs.	Cognitive Levels as per Bloom's Taxonomy
1	<b>Introduction to Object Oriented Programming</b> OOP Concepts: Object, Class, Encapsulation, Abstraction, Inheritance, Polymorphism Features of Java, JVM, Basic Constructs/Notions: Constants, variables and data types,	1	L1, L2
2	<b>Classes, Object and Packages</b> Class, Object, Method, Constructor, Static members and methods, Passing and returning Objects, Method Overloading, Packages in java, creating user defined packages, access specifiers	3	L1, L2, L3, L4

3	<b>Array, String and Vector</b>	2	L1, L2, L3
	Arrays, Strings, String Buffer, Wrapper classes, Vector		
4	<b>Inheritance and Interface</b>	3	L1, L2, L3
	Types of Inheritance, super keyword, Method Overriding, abstract class and abstract method, final keyword, implementing interfaces, extending interfaces		
5	<b>Exception Handling and Multithreading</b>	3	L1, L2, L3, L4
	Thread lifecycle, Thread class methods, creating threads, Synchronization Error vs Exception, try, catch, finally, throw, throws, creating own exception,		
6	<b>GUI programming in JAVA</b>	3	L1, L2, L3, L4
	Applet: Applet life cycle, Creating applets, Graphics class methods, Font and Color class, parameter passing. Event Handling: Event classes and event listener, Introduction to AWT: Working with windows, Using AWT controls-push Buttons, Label, Text Fields, Text Area, Check Box, and Radio Buttons.		

### Books and References:

SN	Title	Authors	Publisher	Edition	Year
1	JAVA: The Complete Reference	Herbert Schildt	Oracle Press.	9th Edition,	2010
2	Programming in Java	Sachin Malhotra and Saurabh Chaudhary	Oxford University Press	5th Edition,	2010
3	Beginning JAVA	Ivor Horton	Wiley India.	5th Edition	2010

**Suggested List of Practical/ Experiments:**

Practical Number	Type of Experiment	*Practical/ Experiment Topic	Hrs.	Cognitive Levels as per Bloom's Taxonomy	
1	Basic Experiments	(A) Program on various ways to accept data through keyboard and unsigned right shift operator. (B) Program on branching, looping, labeled break and labeled continue.	2	L1, L2	
2		Program to create class with members and methods, accept and display details for single object	2	L1, L2, L3	
3	Design Experiments	(A) Program on constructor and constructor overloading (B) Program on method overloading	2	L1, L2, L3, L4	
4		(A) Program on passing object as argument and returning object (B) Program on creating user defined package	2	L1, L2, L3	
5		(A) Program on 1D array (B) Program on 2D array	2	L1, L2, L3	
6		(A) Program on String (B) Program on String Buffer	2	L1, L2, L3	
7		(A) Program on Vector (B) Program on single and multilevel inheritance (Use super keyword)	2	L1, L2, L3	
8		Program on abstract class	2	L1, L2, L3, L4	
9		Advanced Experiments	A. Program on interface demonstrating concept of multiple inheritance B. Program on dynamic method dispatch using base class and interface reference. C. Program to demonstrate try, catch, throw, throws and finally.	2	L1, L2, L3
10			A. Program to demonstrate user defined exception B. Program on multithreading C. Program on concept of synchronization	2	L1, L2, L3
11-15	Mini/Minor Projects/ Seminar/ Case Studies	1. Project on Applet to demonstrate Graphics, Font and Color class. 2. Project on passing parameters to applets 3. Project to create GUI application without event handling using AWT controls 4. Project to create GUI application with event handling using AWT controls	10	L1, L2, L3, L4, L5, L6	

**S.T. Semester –III**

**Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education (CBCGS-HME 2020) Syllabus under Autonomy Scheme**

<b>B.TECH. Internet of Things (IOT)</b>					<b>S.T. SEM :III</b>		
<b>Course Name:</b> Project Based Learning-I					<b>Course Code:</b> HME-IOTPBL301		
<b>Teaching Scheme (Holistic and Multidisciplinary Education -HME) Industry Specific/Interdisciplinary</b>					<b>Examination Scheme (Formative/ Summative)</b>		
<b>Modes of Teaching / Learning / Weightage</b>					<b>Modes of Continuous Assessment / Evaluation</b>		
<b>Total Hours</b>					<b>Presentation</b>	<b>Report</b>	<b>Term Work</b>
<b>Theor y</b>	<b>Tutoria l</b>	<b>Practica l</b>	<b>Contac t Hours</b>	<b>Credit s</b>	<b>(AC)</b>	<b>(AC)</b>	<b>25</b>
-	-	2	2	1	25	-	
<b>AC: Activity Evaluation</b>							
<b>The weightage of marks for continuous evaluation of Term work/Report:</b> Formative (40%), Timely completion of practical (40%) and Attendance (20%)							
<b>Prerequisite:</b> HSD-IOTABL301:ABLIII , HSD- IOTPS301:PSIII, ESD-IOT301:ESDIII (SEM III) Proposed Syllabus under Autonomy Scheme based on “Social Problem Technical Solution”. General knowledge, Social Awareness, Computer Fundamentals and knowledge of Programming Language							

**Course Objective:**

To provide Holistic development with Technical Solution to 21st century Social problem Theme and to create platform for conducive **Learning Environment** for Undergraduate students for **overall professional growth** with **systematic indulgent of Standards and amendments** followed by **industry and research institutes**.

**Course Outcomes:** Student will be able to

Sr No	Course Outcomes	Cognitive levels as par bloom's Taxonomy
1	Identify social problems and apply their knowledge to design a technical solution on multidisciplinary areas.	L1,L2,L3
2	Analyze the various aspects of a technical solution and also Work as a team.	L1,L2,L3,L4
3	Develop a prototype to address social problem.	L1,L2,L3,L4,L5

**Project List:**

Sr No	Title of Project	Type of Project
1	Design and develop a database for Metal Extraction from E-Equipment and suggest application for Recycle them.	Application
2	Design and develop a database for Plastic Extraction from E-Equipment's and suggest application for Recycle them	Application
3	Design and develop a database for Small Household Equipment and suggest application for Recycle them	Application
4	Design and develop a database for a Plastic Extract Material for 3D Printing Applications	Application
5	Design and develop a database for Electronic toys Spare Parts Extraction and suggest application for reuse them	Application
6	Design and develop a database on Girl Education-a right of society	Application



**TCET**

**DEPARTMENT OF INTERNET OF THINGS**

Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education [CBCGS-HME 2020]

Under TCET - Autonomy Scheme - 2020

**University of Mumbai**



7	Design and develop a database for Education and mental Health Caring for Economically backward student education	Application
8	Design and development website for family stability and child development during Lockdown/Unemployment/financial issues	Application
9	Design and development website to create awareness about career opportunities beyond IITian.	Application
10	Design and development website for Power bank from E-Waste Batteries	Application
11	Design and development website to suggest Convert of nonmetallic extracts of household equipment's in the Biodegradables	Application
12	Design and development website to suggest conversion of waste extract of Household Equipment's for Daily Applications	Application
13	Design and development website for E-waste usable -supply chain-Business management System	Application
14	Design and development website for Reuse of 2nd Generation Computer for today's applications of computing	Application
15	Design and development website to create awareness among humans about animal slaughtering	Application

**S.T. Semester –III**

**Choice Based Credit Grading Scheme with Holistic and Multidisciplinary Education (CBCGS- HME 2020) Syllabus under Autonomy Scheme**

<b>B.TECH. Internet of Things (IOT)</b>					<b>S.T. SEM :III</b>		
<b>Course Name : Activity Based Learning-III (Co-Curricular/Extra-Curricular/Extension)</b>					<b>Course Code :HME-IOTABL301</b>		
<b>Teaching Scheme (Holistic and Multidisciplinary Education -HME) Industry Specific/Interdisciplinary</b>					<b>Examination Scheme (Formative/ Summative)</b>		
<b>Modes of Teaching / Learning / Weightage</b>					<b>Modes of Continuous Assessment / Evaluation</b>		
<b>Hours Per Week</b>					<b>Presentation</b>	<b>Report</b>	<b>Total</b>
<b>Theory</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Contact Hours</b>	<b>Credits</b>	<b>(AC)</b>	<b>(AC)</b>	<b>50</b>
-	-	2	2	1	25	25	
<b>AC: Activity Evaluation</b>							
<b>The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of practical (40%) and Attendance (20%)</b>							
<b>Prerequisite: Basics of Computer, General Knowledge, Social Awareness</b>							

**Course Objectives:**

SN	Course Objectives
1	The larger objective of the course is to prepare students for Leadership and Excellence in their life roles by continually engaging students in both individual and team activities that explore important issues or phenomena, use multiple media and technologies, create products that embody the results of the students explorations, and call the students to explain their work and products to adult and student audience.
2	Further the course also aims to develop the Society Sensitive Citizens by creating awareness among students and take up the initiatives in the Activity mode for the needy.
3	The course intends to deliver the understanding of the concepts of critical thinking, encourage the students to look beyond their textual knowledge, establish the relationship between theory and the applications of the learned concepts.
4	It also intends to address the social issues and help the society in the area of work

**Course Outcomes:**

Student will be able to:

SN	Course Outcome	Cognitive levels of attainment as per Bloom's Taxonomy
1	Outline the procedures for debate and demonstrate parliamentary debate and policy debate styles. Learn on multidisciplinary subjects. This brings out the excellence attribute in students with updated awareness in either topics technical or current affairs.	L1,L2,L3
2	Student will in the process figure out the various benefits of quiz competitions, also Work as a team.	L1,L2,L3
3	Make the society awareness about various social issues which teaches them a overall team spirit with decisive acumen qualities for excellence.	L1,L2,L3

**Detailed Syllabus:**

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	<b>Brainstorming</b>	4	L1, L2, L3
	<b>I. Introduction to debate, Definition and types of Brainstorming</b> Brainstorming session among students on various topics floated for debate. Topics can be Academic or Parliamentary, Financial, International affairs, technology trends, Technical or philosophical. Expressing views by each student for /against topic for 1 minute. <b>Evaluation by faculty as per format.</b>		
2	<b>Quiz (Technical and Current Affairs)</b>	2	L1, L2, L3
	<b>I. Introduction to Quiz</b> , Definition, Types of quiz, Rules of quiz, quiz rounds. Quiz competition on Technical topic with 50 MCQ. <b>II. Quiz competition on current affairs</b> with 50 MCQ. <b>Evaluation by faculty as per format.</b>		
3	<b>Personality Development</b>	4	L1, L2, L3
	<b>I. Word association (Test Sentence Building) (2 Hrs.)</b> Students are shown 60 English words one after other and a short sentence using the words shown are to be written. Each word will appear for 15 seconds and sentence is to be written within this period only. At least 45 words are to be attempted to get good marks  <b>II. Thematic Apperception Test (Short Story Writing) (2 Hrs.)</b> 12 Slides will be projected, and stories are to be written in 03 Minutes. Discussions on Stories written by students <b>Evaluation by faculty as per format.</b>		
4	<b>Turning A Waste into Useful Products/ Renewable Energy</b>	2	L1, L2, L3
	<b>I Introduction:</b> Minimize the generation of wastes and to reuse and recycle them. This activity brings out the excellence in critical thinking and application in team. This is to be practised for designing the flow chart for application and not to develop product.  <b>II Domain wise distribution:</b> The different branches can plan as per their domain knowledge or can be worked in disciplinary way. Domain wise ideas.  <b>E&amp;TC and ELEX can work on themes like electronic wastes collection as dc motor etc , to create some power generating model.</b>		
5	<b>Game Based Learning</b> <b>I Introduction:</b> Games provide a different pedagogical perspective within a higher education context. They provide a stimulating environment with a learning outcome in fun style. Different Games viz. Puzzle, Sccriblenaut , computer aided design assembly delivery using the game in mechanical engineering branch ,can be played in class with a game concept document as a learning outcome	2	L1, L2, L3
6	<b>Extension Work</b> <b>I. Introduction to Role play) (4 Hrs.)</b> , types of Role play. Writing and demonstration of street Play on social Issues Water conservation Waste Management	2	

	Plastic Ban etc.	6	
	<p><b>II. Education for needy</b> Education on social Issues like social media, youth related issues etc. Education on health issues Education on issues related to senior citizen etc.</p> <p><b>III. The education/ awareness</b> needs to be conducted in campus through presentation (placards, posters etc.), survey's, data analysis and evaluation <b>Evaluation by faculty as per format.</b></p>	6	
	<b>Total Hours</b>	<b>30</b>	

**Books and References:**

SN	Title	Authors	Publisher	Edition	Year
1	Competitive Debate	Richard Earl	-	-	-
2	Times Quiz book by Times Mind Games	OLovBjortomt	-	-	-
3	Renewable: The World-Changing Power of Alternative Energy		St. Martin's Press	First Edition	2013

**Online References:**

S. No.	Website Name	URL	Modules Covered
1	www.thebetterindia.com	<a href="https://www.thebetterindia.com/111/teaching-street-children-a-thing-or-two/">https://www.thebetterindia.com/111/teaching-street-children-a-thing-or-two/</a>	M1 to M6